REMARKS
ON
A CASE OF SUICIDAL POISONING WITH BURNETT'S FLUID.

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A MAID-SERVANT, aged 21, was brought from a village near Oxford to the Radcliffe Infirmary on the afternoon of February 2nd, 1874. The person who brought her stated that she had taken Condy's fluid* about six hours before. An emetic was at once given, and vomiting encouraged by draughts of warm water. The girl was put to bed, and ordered to take nothing but cold milk. I saw her on the following morning. The body was plump and well nourished. She lay on her back, with an anxious and depressed face; was quite sensible, and answered all questions clearly and readily; but her voice was feeble, almost whispering. She stated that on the previous day, about noon, in consequence of a quarrel with her fellow-servant, the cook, she resolved, in a fit of desperation, to destroy herself. She went to a cupboard where was a bottle labelled "poison", containing a white fluid; she uncorked the bottle, poured out about three-parts of a teacupful, and drank it off. As the fluid passed down into the stomach she felt no pain, but directly afterwards she was seized with a violent burning pain at the pit of the stomach, and vomited the contents of the stomach. She was now suffering from a feeling of great faintness, and a burning pain at the epigastrium and under the left ribs. Her throat was sore, and she had some difficulty in swallowing. She had retched frequently since admission, but there had been no action of the bowels. The lips, mouth, and tongue, were unhurt; but the soft palate, uvula, tonsils, and pharynx, were inflamed. There was much tenderness on pressure at the epigastrium. Pulse 144, very feeble. She was ordered to suck ice, and to continue the cold milk.

February 4th. She had severe pain in the epigastrium and left hypochondrium. There was less vomiting, but still a little retching, with which she brought up a little mucus. She felt very faint if she attempted to raise herself in bed. The mucous membrane of the soft palate was covered with a white film, not unlike diphtheritic membrane. A slough was separating from the right tonsil and uvula. She had had no action of the bowels. There was no albumen in the urine.

February 8th. The vomiting had stopped for three days. The pain was relieved. The soft palate was covered with a yellowish slough.

February 12th. The vomiting had begun again last night, when she brought up a potful of black fluid, with much mucus, some shreds of tissue, and much clotted milk. The sloughs in the throat had not yet separated. Pain was constantly felt in the left hypochondrium, and was increased by food. She was ordered to continue milk-diet, and to have an enema of warm water.

February 20th. A copious black pitchy stool followed the enema. She had had no more sickness. The throat had healed.

March 9th. The pain and sickness, which had abated for awhile, had returned. She had suffered occasionally from attacks of tetanic spasm in the right forearm and hand, which lasted for a few minutes and then passed off, being unattended with loss of consciousness.

March 23rd. She was in much the same state. Yesterday she had passed, after an injection, another copious dark pitchy stool.

April 2nd. The vomiting and pain had both increased, and she was rapidly losing flesh. She was ordered to take nothing but ice by the mouth, and to have four times in the twenty-four hours an injection of strong beef-tea and brandy.

April 9th. She had continued vomiting, though nothing but ice had been taken. The vomited matters contained a considerable quantity of altered blood.

April 18th. She had become steadily thinner and weaker. The vomiting had continued quite uninfluenced by remedies, of which prussic acid and morphine had been the chief. The vomited matters were whitey-brown in colour, with a dark sediment. The gums were becoming spongy, and bled.

May 9th. Injections of beef-tea and brandy had been continued steadily. She had sucked ice and sipped iced water, and occasionally sucked an orange, but nothing else was taken by the mouth. She still, however, retched and vomited, at intervals, a brownish fluid with a flocculent sediment, but not containing bile. She had passed daily on an average one pint of urine, of specific gravity 1025-1030, turbid with lithates, but not containing albumen. There had been no action of the bowels since March 23rd.

May 22nd. Yesterday, after an injection of warm olive oil, she passed a copious motion, pultaceous in consistence, and of a greenish colour—the first action of the bowels for eight weeks. The vomited fluid was now tinged with bile.

May 29th. There was extreme emaciation; the gums were spongy; and she had a peculiar fœtor of breath. The trunk and extremities had a strange bluish mottled appearance, from innumerable petechiæ and vibices. The skin of the legs was covered with thick scales. Her intellect was clear by day, but she wandered at night. Her voice was reduced to the faintest whisper. She retched at intervals, and vomited a greenish fluid. Pulse 130, scarcely perceptible. Injections of beef-tea and brandy were still continued, and had been now given uninterruptedly for fifty-seven days, during which time she had taken nothing but iced water and a little orange-juice by the mouth. She died the same afternoon.

Her temperature rose for the first few days after the poison was taken till it reached 100.6 deg.; it then slowly fell, and reached its lowest point, 96.4 deg., on May 8th; from which time till death it ranged from 96 to 98 deg., but never fell below 96, though it was taken within a few hours of her death. Life was prolonged one hundred and sixteen days after the poison was swallowed, during which time the bowels were moved only three times.

The verdict was, "That the deceased took poison while in an unsound state of mind".

Necropsy, by Dr. Rayne and Myself, Seventeen Hours after Death.—The body was greatly emaciated. Rigor mortis was slight in the legs; very slight in the arms. The surface of the trunk and extremities was very thickly covered with ecchymoses, seen during life. The skin was tough; there was no trace of subcutaneous fat. The muscles were pale and wasted. The omentum was shrunken and filmy, totally devoid of fat. *Heart:* There was a mere trace of fluid in the pericardium. The substance of the heart was generally pale, soft, and flabby. A large pale clot, entangled in the tricuspid valve, extended through the auriculo-ventricular orifice into the right auricle. There was a little atheroma on the anterior segment of the mitral valve. The *Lungs* were healthy. There were old tough adhesions on the right side; the left pleura was empty of fluid, dry and sticky. The pharynx and œsophagus were healthy. *Stomach:* With the exception of the cardiac orifice, which was healthy, the whole of the mucous membrane of the stomach was of a deep red colour, thickened, and softened. This redness was uniformly intense, as far as that part of the fundus which lay in contact with the spleen: here the redness was deeper than elsewhere, and there was an ulcer of the size and shape of a penny-piece, which had penetrated the coats of the stomach, but had been prevented from perforating, partly by the spleen, which formed the floor of the ulcer, partly by adhesions which passed from the spleen to the stomach, and were recent and thin, so as to tear readily when stretched. The stomach contained from half a pint to a pint of green fluid, just such as the girl had vomited during the last week of life. The pyloric orifice was small and tight from firm contraction of its sphincter, but there was no real constriction of the opening. *Small Intestines:* The duodenum, in its ascending and descending portions, was congested and bile-stained; in its transverse portion, deeply congested. The jejunum and ileum were deeply congested throughout; the solitary follicles were swollen and bright red. In the subperitoneal coat of the lower ileum were a few deep ecchymoses, reminding one of what is seen in the skin. *Large Intestines:* The cæcum was congested. The mucous membrane of the large intestine, from the ascending colon to the rectum, was of a dull leaden colour, with here and there an admixture of the deep red seen in the small intestines. A considerable quantity of greenish pultaceous fæcal matter was contained in the transverse and descending colon. The *Liver* was large and swollen, with rounded margins; it weighed sixty-three ounces. The surface was smooth, greasy, soft, and doughy, of a pale fawn-colour. On section, it was soft and greasy, breaking down readily under the finger; of the same fawn-colour as the surface. The lobules were large and distended with fat. The gall-bladder was distended with bile. The *Pancreas* was of the same pale fawn-colour as the liver, evidently fatty. The *Kidneys* were large, swollen, buff-coloured: the capsule stripped off too easily. On section, the cortex was found to be increased in thickness, and buff-coloured; the pyramids were deep red, offering a marked contrast to the cortex. The calyx of the right kidney was distended with a discoloured fluid containing much gritty substance. The ureter was blocked at its orifice by a small mulberry calculus.

* On subsequent inquiry, it was ascertained that the bottle from which the poison was taken contained Burnett's, not Condy's, fluid.

Microscopical Examination.—Liver: On scraping the cut surface, nothing but fatty granules and oil-globules were seen; no liver-cells. Sections of the liver were hidden by agglomerations of large oil-globules. Where the liver-cells could be here and there seen, they were stuffed out with oil. *Kidneys:* On scraping the cut surface of the cortex, nothing but fatty and granular matter could be seen—no portions of tubules, and no cells. On sections of the cortex, the convoluted tubes were swollen, and appeared almost black with granular and fatty matter. Where the tubules were cut transversely, the epithelium could only be seen in some of them; in the greater part it was hidden by abundant granules. On freezing portions of the cortical substance with ether-spray, and making very fine sections with a Beale's knife, the epithelium lining the tubules was brought into better view, but was still in part hidden by fatty granules. The pyramids were unaffected by this fatty accumulation. *Heart:* The muscular fibres of all parts of the ventricular walls were in a state of advanced fatty degeneration. The pectoral and rectus muscles showed fibres in different stages of fatty degeneration, but none so advanced as in the heart.

REMARKS.—Chloride of zinc, from the mere accident of Burnett's fluid being in the hands of the people of this country, may be fairly called an English poison. In a case which occurred in Germany some years ago (Canstatt's *Jahresbericht*, 1866, p. 307), recovery followed after sixty grains of the salt in solution had been swallowed; but I can find no other instance of the kind recorded in foreign publications. In England, this poison has now proved fatal several times, and has been taken in the form of Burnett's fluid, either with suicidal intent, or accidentally, by mistake for "fluid magnesia". Death follows more often rapidly, by the violent twofold action of the poison as an irritant or corrosive and as a depressor of the nervous system. But occasionally life has been prolonged for many days, or even weeks; the patient sinking at last from inanition caused by the secondary effects of the poison on the œsophagus, stomach, and intestines. Of ten fatal cases recorded, including my own, death was rapid in six, more or less protracted in four. Where death is rapid, intense inflammatory changes are found in the fauces, œsophagus, and stomach, and sometimes, though not always, in the lips and mouth. Where death has been slow, there has been found, once, thickening of the coats of the stomach and closure (? constriction) of the stomach; once, complete closure of the stomach by constriction of the pyloric end; once, softening and well marked ulceration of the stomach and intestines, with extravasation of much blood; once (my own case), inflammation and ulceration of the stomach, together with inflammation of the small intestines.

As regards the smallest quantity of the fluid which is sufficient to destroy life, nothing positive can be said—much depending on the emptiness or fulness of the stomach at the time when the poison is taken, on the rapidity with which vomiting follows, and on the time that elapses before medical help can be summoned. In Dr. Wardell's case (*Lancet*, January 9th, 1864), "three parts of a wineglassful" caused rapid death; and the same writer refers to a case in the *Times* of July 6th, 1863, where half a wineglassful had a similar result. Now, an ordinary modern wineglass for sherry holds, on an average, two-and-a-half ounces of fluid; an ordinary port-wineglass, nearly three ounces: indeed, I am not sure that I could not produce one of the latter sort from one of our Oxford "Common-rooms" capable of holding four ounces. At any rate, half a wineglassful must be equivalent to at least an ounce. According to Pereira's estimate, one fluid-drachm of Burnett's fluid contains twenty-five grains of zinc-chloride; so that an ounce of the fluid, containing two hundred grains of the salt, has been known to cause rapid death. On the other hand, Dr. Hassall's case (*Lancet*, August 20th, 1853) swallowed three ounces by measure of the fluid, equal to six hundred grains of zinc-chloride, and recovered after a very severe and protracted illness. This is the largest dose which I can find recorded as being taken without a fatal result. In my own case, the teacup from which the girl drank contained by measure six ounces; so that, from her own account, she must have taken at least four ounces of the fluid. With Dr. Hassall's case before us, it is quite possible that she may have taken this quantity and have lived a hundred and sixteen days, more especially as she vomited quickly the contents of the stomach.

From a medico-legal point of view, the absence of all injury to the lips and mucous membrane of the mouth is worthy of notice. The same fact was observed by Wardell and Hassall, and is doubtless to be explained by the way in which the fluid was drunk—tossed off, and not sipped.

Other interesting features in this case are: 1. The tetanoid contractions of the arm, which were also observed by Dr. Hassall in a marked degree; 2. The long time—fifty-seven days—that life was supported by injections, water only being taken by the mouth; 3. The abundant petechial spotting and streaking of the body, which has been occasionally seen in death from starvation (Taylor's *Medical Jurisprudence*, p. 744); 4. The remarkable fatty changes in certain organs of the body and in the muscular tissue, coexisting with extreme general emaciation of the body. These changes were of two kinds. In the liver, kidneys, and pancreas, there was a positive infiltration or accumulation of fat, not a substitution or degeneration; for, after the fat had been removed from them in the process of mounting microscopical preparations, the natural structures were found to be perfect; the epithelial lining of the tubules of the kidney more especially was as regular and well preserved as in the illustrations given in books. In the muscles, on the other hand, there was a true fatty substitution or degeneration. Two different explanations of these strange appearances may be given. It may be said that chloride of zinc is analogous to phosphorus in its action on the tissues; both poisons being strong irritants, and both having a powerful action on the nervous system. That the liver is directly affected by chloride of zinc, is clearly shown by Dr. Hassall, who noticed for a long time an almost complete absence of bile in the stools of his patient. Dr. Letheby (*Medico-Chirurgical Transactions*, 1850) also points out that the same poison acts with energy on the kidneys; he found these organs greatly congested after rapid death from Burnett's fluid. Lastly, the *post mortem* appearances in my case are identical, as far as the fatty changes are concerned, with those enumerated in cases of phosphorus-poisoning scattered through German and French medical literature. But, in phosphorus-poisoning, this fatty infiltration and degeneration begin very shortly after the poison has been taken. Less than a week suffices to produce them in a marked degree; and, in a case recorded by Fritz (*Archives Générales de Médecine*, July 1863), advanced "steatosis" of the liver, kidneys, and muscular tissue was developed within seventy-seven hours from the time that the phosphorus was taken. Now, in no single instance of poisoning with chloride of zinc, whether acute or chronic, has any such steatosis been hitherto met with; nor has the jaundice which is so regular a symptom in phosphorus-poisoning ever been seen after chloride of zinc has been taken. Inasmuch, then, as the case that I have related stands alone in respect of the peculiar *post mortem* appearances under consideration, a more probable way of explaining them is this: that the fatty infiltration of the internal organs is a result of the slow process of starvation which the girl's body underwent, and is, therefore, to be compared with that storing up of fat in the liver seen after death from phthisis and other diseases of emaciation. Frerichs (*Diseases of the Liver*, New Sydenham Society's translation, vol. i, p. 298) has found fatty liver as a frequent accompaniment of death from inanition consequent on diseases of the stomach, stricture of the œsophagus, etc. He would, no doubt, consider this girl's condition as favourable to this kind of fatty accumulation. Kept absolutely at rest in bed, with no muscular waste; her breathing reduced to its lowest limits, and thus imitating the obstructed respiration of the phthisical; an abundant natural development of fat in the outset; a diminished secretion of bile from impaired or spoiled digestion; the body supplied with alcohol as its chief food for several weeks before death,—it is likely that her blood would become "loaded with fat taken up during the advancing emaciation, in order to be employed for supplying the demands of the metamorphosis of matter in the system" (Frerichs, *op. cit.*, p. 285); and that this fat would, as in the phthisical, accumulate gradually in certain of the internal organs. The true fatty degeneration of the muscular tissue is probably to be regarded as a form of "necrobiosis", or slow death of tissue, commencing even while the body as a whole was still alive.

As regards the treatment of this form of poisoning, one or two different plans have been tried with success; but, of course, everything depends on the time which has elapsed before an antidote can be given. So concentrated is Burnett's solution, that a very short contact with the mucous membranes is enough to corrode them and convert them into a substance which has been compared to leather. In Dr. Hassall's case—the most remarkable instance of recovery on record—a mixture of eggs and milk was freely administered, and continued as long as it was vomited in a curdled state. He recommends strongly the administration of "copious and long continued supplies of albuminous matters". In a case related by Dr. Stretton, soap-suds were given freely, and life was saved after two hundred grains of the chloride in a wineglassful of water had been taken. The carbonates of potash and soda have also been successfully used; and it seems reasonable that, if a person could be seen soon enough after the poison had been swallowed, there could hardly be a better plan of treatment than this. Copious draughts of warm water, holding in solution one of the alkaline carbonates, would throw down the insoluble carbonate of zinc, and at the same time promote vomiting. In my own case, it was impossible to adopt any definite plan of treatment, seeing that the girl was not brought to the Infirmary for six hours, and that the real nature of the poison was not made known when she did arrive.